correct amount of GR-303 IDLC should be increased from 10% to 82%, and a 4:1 line concentration ratio should be assumed.

Q. HOW DOES THE PERCENTAGE OF GR-303 IDLC AFFECT SWITCH COSTS?

A. GR-303 IDLC typically has a lower cost for ports than other types of line port terminations at the switch because it is engineered to concentrate traffic and is brought into the switch at DS1 levels. Thus, Verizon's understatement of the amount of GR-303 results in inflated switch costs.

Q. ARE VERIZON'S SCIS DATA INPUTS FOR THE COST OF GR-303 INFLATED?

A. Yes. In addition to understating the percentage of GR-303 in a reconstructed network, Verizon overstates the cost of GR-303. If the SCIS input data do not optimize the engineering characteristics of the equipment, SCIS will compute an inefficient GR-303 IDLC arrangement, and the cost results will be inflated. This has occurred in Verizon's cost study, as Verizon entered usage on GR-303 lines that is unreasonably high and should be reduced by 30%.[68]

D. VERIZON'S PORT UTILIZATIONS CAUSE INFLATED SWITCH PORT UNE PRICES

Q. HOW HAS VERIZON USED PORT UTILIZATIONS?

A. Verizon calculates port costs based on data in SCIS. Verizon enters fill factors directly into SCIS, and SCIS inflates the cost based on Verizon's fill factor inputs.

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[68] The IDLC modifications are not reflected in the restated rates.

In addition, SCIS automatically computes "breakage," which recognizes that the last units of components with large capacities will, on average, not be fully utilized. SCIS, therefore, increases the cost of each port by the fill factor entered by Verizon and the "breakage" calculated by SCIS.

Verizon subsequently makes outboard adjustments[69] to Verizon's VCOST model that further reduce utilization and thereby inflate all the line and trunk port costs. Verizon characterizes the adjustments as required to reflect "actual" utilizations. But Verizon has already accounted for utilization by using the SCIS utilization data.

Q. IS VERIZON'S USE OF "ACTUAL" UTILIZATIONS CORRECT IN A TELRIC STUDY?

A. No. Verizon's current levels of utilization reflect embedded practices that are not relevant in a forward-looking TELRIC study.

Q. WHAT SHOULD BE USED AS UTILIZATIONS IN A FORWARD-LOOKING STUDY?

A. The Verizon fill factors entered into SCIS and the "breakage" calculated by SCIS are sufficient and reasonable. Thus, the utilization inputs in V-Cost should be set to 1.0.[70]

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[69] These adjustments can be seen in the Supporting Documentation Section 5 of Verizon's port cost studies. These utilizations can also be seen in the Inputs section labeled as Line Utilization Adjustment, Analog Utilization Adjustment, etc.

[70] AT&T/WorldCom's restated rates have used these port inputs for a different purpose that will be explained later in this testimony. Thus, when looking at the V-Cost inputs for utilizations in the Restated cost study filing, these numbers will not be 1.0.

E. FEATURE PORT ADDITIVES ARE INCORRECT

Q. WHAT TYPES OF EQUIPMENT ARE INCLUDED IN VERIZON'S CLAIMED FEATURE PORT ADDITIVES?

A. According to Verizon, these claimed costs represent hardware that must be purchased to provision features.[71]

Q. HOW DOES VERIZON COMPUTE THE CLAIMED COST OF THIS EQUIPMENT?

A. Verizon says it used the feature module (SCIS/IN) of the SCIS program to calculate most of these costs.

Q. HOW DOES THE DISCOUNT INPUT DISCUSSION ABOVE AFFECT THE FEATURE MODULE OF SCIS?

A. Like the SCIS/MO module used to calculate switch investment, the SCIS/IN program requires discount inputs to be entered so that net prices for feature-related hardware can be correctly calculated. Verizon's claimed feature investments suffer from the same failure to use the appropriate new switch discount as did Verizon's switch investment. As a result, Verizon's feature investments have been overstated due to inappropriate discount inputs.

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[71] Feature hardware includes conference circuits and special announcements used only for features.

Q. WHAT CORRECTIONS NEED TO BE MADE TO VERIZON'S FEATURE PORT ADDITIVES?

A. The SCIS/IN-produced investments for feature hardware must be recalculated to reflect the same AT&T/WorldCom proposed new switch discount inputs as were used in the AT&T/WorldCom recalculation of the SCIS/MO model.

Q. WILL THE FEATURE COSTS BE CORRECT IF THE APPROPRIATE DISCOUNTS ARE USED?

A. No. Verizon has made additional SCIS/IN input errors relating to features. A number of features rely on screen list editing, which screens telephone numbers.[72] The cost of these features depends on the number of lines per office that use screen list editing. This input value should not vary from feature to feature because it reflects the number of lines in the office that have at least one feature that uses screen list editing. Nevertheless, in its cost studies in this case, Verizon's inputs on this point vary dramatically.[73]

It is not possible to discern whether there are additional input errors in Verizon's calculation of feature costs because Verizon has not made any data

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[72] Screen list editing lines are lines that have one or more features that allow them to build a list of telephone numbers for screening of incoming calls. SCIS/IN uses this input to allocate the cost of switch equipment across all lines in the switch sharing the equipment used in any feature that uses screening. The affected features include Distinctive Ringing/Call Waiting, Selective Call Rejection, Selective Call Forwarding, Selective Call Acceptance for Centrex lines and Individual Lines as well as the Selective Call Rejection for ISDN lines

[73] *See* Verizon's "Unbundled Switch Ports and Features, Subsection #3.4 SCIS/IN Ftr Inputs".

available for review regarding these inputs, nor has it provided explanations of how the inputs were developed.[74]

Q. HOW DO YOU PROPOSE TO CORRECT THESE ERRORS?

A. Verizon has not provided the information necessary to support its costs for features,[75] and therefore, it would be appropriate to eliminate the port additives entirely. If, however, the Commission declines to take that step, then at a minimum the discount inputs and the inconsistent set of inputs for the number of screen list editing lines per office must be corrected.[76] AT&T/WorldCom's restated rates in Attachment 1 to this testimony reflect these corrections.

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[74] In AT&T Data Request Number 9, Request 26, AT&T asked Verizon to explain the rationale and assumptions for inputs to SCIS/IN and to provide documentation for the inputs. Verizon's response refers to its response to AT&T Data Request Number 9, Request 15 that states the data were collected from product managers in 1997. No documentation or other explanations are offered. Verizon also refers in its response to ATT Data Request Number 9, Request 21, which points to the lists of inputs it used, but again, without explanation or supporting documentation.

[75] Based on the limited information received to date, AT&T/WorldCom cannot correct the inputs (other than the screen list inputs); however, should additional data be made available by Verizon, supplemental testimony may be required regarding feature inputs.

[76] The correct "lines sharing screening" input for all of the screening features would be the largest number of lines that Verizon entered as an input.

F. VERIZON MISIDENTIFIED COST CAUSATION AND THEREFORE HAS MISASSIGNED COSTS TO ITS VARIOUS SWITCH RATE ELEMENTS

Q. WHAT ARE THE CAPACITY RESTRAINTS ON MODERN DIGITAL SWITCHES?

A. As Ms. Pitts stated in her Direct Testimony, digital switches are port-limited, and are not constrained by peak period usage.[77] Indeed, Verizon studies show that the average processor utilizations are infinitesimally small compared to the available call processing capacities (not total capacity – only the vendor-stated call processing capacity).[78] This level of small utilization is typical of the current generation of digital switches – they are designed to take advantage of the huge economies in computer chip technologies to ensure that a switch will not exhaust on processing or memory power. Verizon studies show that its switches will never exhaust its call processing capacities in their lifetimes.[79]

Verizon implicitly acknowledges this fact when it asserts that usage for reciprocal compensation does not affect the processing capacities of a switch.[80]

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77 See the following. VZ-MA: J. Gansert's testimony, New York Case 95-C-0657, 94-C-0095, 91-C-1174, page 24. SWBT: Transcript (pg 3556) of Costing Pricing Issues SWBT Arbitration PUC Docket 16226, 11/3/96 cross of Raley. Ameritech: Direct Testimony of William Palmer, ICC Docket 96-0486, Ameritech-Illinois Exhibit 3.3. Pacific Bell: R. Scholl February, 1997, deposition in case R.93-04-993 and I.93-04-002.

78 *See* Attachment 4, filed herewith, which displays the average switch processor utilizations contained in the SCIS model as run by Verizon.

79 Id. (showing Verizon's SCIS inputs for [1] years to processor exhaust and [2] years to replacement).

80 Panel Testimony at footnote 7.

The appropriate cost driver for today's digital switches is ports, not peak period usage.

Q. HOW DOES THE FACT THAT PROCESSING CAPABILITY OF MODERN DIGITAL SWITCHES IS NOT A CONSTRAINT AFFECT VERIZON'S COST STUDY?

A. Verizon has improperly allocated the substantial processor, memory and other "getting started" costs to the minute-of-use element of its switch rates. These "getting started" costs do not vary with respect to lines or trunks. The line and traffic inputs to SCIS can be modified by an order of magnitude, but the "getting started" cost will not change even one penny.[81]

The only time the "getting started" cost will be replicated is when a second switch must be installed because the port capacity was reached. Therefore, the cost driver is ports. The "getting started" costs should be assigned to the ports, not the minute-of-use.

Just as it is imperative to ensure that non-recurring costs be recovered via non-recurring cost elements, it is critical that non-traffic sensitive costs not be recovered via traffic sensitive elements.

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[81] This can be seen by viewing the office-by-office results in Verizon's SCIS database. The "getting started" cost of a switch does not change, except when remote switches are added to a host switch, because the remote's "getting started" costs are added to the host's "getting started" cost.

Q. HOW DO YOU PROPOSE TO ASSIGN COSTS TO THE TRAFFIC SENSITIVE AND NON-TRAFFIC SENSITIVE COST CATEGORIES?

A. Verizon has included the SCIS outputs by detailed cost category on Page 2 in Subsection 5.9 in the Switching MOU cost study. These cost categories must be assigned to the appropriate element. In making these determinations, an engineering analysis helps understand the functions and capacities of the equipment whose costs are being assigned, and an economic analysis helps ensure conformance to long-run, forward-looking cost methodology that assigns costs based on economic cost causation.

Some categories are obvious: Line Termination costs (analog and IDLC), BRI and PRI costs (for ISDN line and trunks, respectively), and other ISDN-related port costs are unequivocally assigned to ports.

Q. WHAT ARE THE "EPHC" CATEGORIES AND WHERE DO THEY BELONG?

A. There are four EPHC categories in the 5ESS switch SCIS/MO outputs (two in the non-ISDN investments and two in the ISDN investments) that also should be assigned to ports and non-traffic sensitive costs. EPHC is an output category that captures the common equipment in the switch module, which is the primary building block component of the 5ESS switch's distributed architecture. This common equipment's maximum port capacity is always reached before its call

processing capacity.[82] Therefore, the cost driver is ports, and the EPHC costs should be assigned to the ports.[83]

Q. WHAT SCIS COST OUTPUT CATEGORIES SHOULD BE ASSIGNED TO THE PEAK PERIOD USAGE CATEGORIES?

A. The Line CCS categories (ISDN and non-ISDN), the D Channel Access PPS, PPB Channel Access PPS, and Inter-Switch PPS[84] and SS7 link costs should all be assigned to the traffic sensitive category, because this equipment is engineered and purchased based on peak period usage.[85]

The trunk costs are separated and assigned to the common trunk MOU, which is also peak period usage sensitive.[86]

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82 This can be seen in the Line Termination output reports from SCIS that will always show "Excess SM EPHC Capacity Inv." (subcategory of the "Part C" costs in the Line Termination Investment) assigned to every port because the port capacity of the switch module was reached before the usage capacities could be completely utilized. These excess capacity categories are labeled 'Part C' of the Line termination costs.

83 AT&T/WorldCom's restated switch cost study has computed a port additive factor to assign the getting started and EPHC costs to the ports. The factor development can be seen in the Restated Workpapers, Section #5.9 EO Material Investment. The factor is then entered into V-Cost, using Verizon's port utilization inputs. This was done to avoid having to make algorithm changes to V-Cost.

84 These categories reflect equipment engineered based on either voice busy hour minutes of use or ISDN data busy second packet usage.

85 Please refer to Ms. Murray's Direct Testimony regarding the difficulties of developing pricing structures for peak period costs.

86 Note that Verizon's analysis initially and temporarily assigns trunk ports to the non-usage costs in the cost study (see Subsection #5.9, page 2) to isolate the local switch usage costs to develop the switch MOU rate element. The trunk costs are subsequently isolated from the non-usage category and assigned appropriately in the Digital Trunk Port development that is then used to calculate the common trunk MOU cost.

Q. HOW MUCH OF THE TOTAL SWITCH INVESTMENT IS TRAFFIC-SENSITIVE?

A. A very small percentage of the overall investment in current digital switch technology is engineered based on peak period usage. The allocation of the SCIS outputs to the traffic sensitive and non-traffic sensitive categories can be seen in Attachment 5.[87]

Q. HOW DOES THIS RELATE TO THE MODIFIED SYNTHESIS MODEL INPUT USED TO ALLOCATE SWITCH COSTS TO PORT AND MOU RATE ELEMENTS WHEN THE FLAT-RATED PORT OPTION IS NOT USED?

A. The information in Attachment 5 described above can be used in the Modified Synthesis Model to allocate switch costs to port and MOU rate elements.[88]

G. RIGHT-TO-USE FEES ARE UNSUBSTANTIATED AND SHOULD BE REJECTED, AND THE RIGHT-TO-USE FEES ARE MISASSIGNED TO THE USAGE SENSITIVE RATE ELEMENTS.

Q. HOW DID VERIZON DETERMINE THE COSTS OF RIGHT-TO-USE (RTU) SOFTWARE?

A. Verizon's right-to-use software cost is an allocation of an annualized software expense for Verizon-East based on historical data for 1999 and 2000, plus forecasts for 2001 and 2002.

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87 The percentage of Verizon's total switch investment that is peak period usage related, including trunks, is also identified in the Restated Workpapers Subsection 5.9 EO Material Inv. (electronic workpapers AT&T VA_Part C-8-1 Switch MOU Supp(1).xls.

88 The 40% traffic sensitive input to the Synthesis Model referenced in Ms. Pitts' Direct Testimony was not implemented, and the FCC's default inputs were used. These estimates are superseded by the actual Verizon percentage data set forth in Attachment 5.

Q. IS THE TOTAL FORECASTED RTU AMOUNT APPROPRIATE?

A. It is difficult to determine if the RTU amount is appropriate, because Verizon did not provide any supporting documentation for the high level estimates it used.

Q. WHY DO YOU QUESTION THE VERIZON-EAST RTU FEE AMOUNTS?

A. RTU fees can vary dramatically, as is illustrated by Verizon's own cost study workpapers in this proceeding.[89] Verizon included 1999 data that appear to be inconsistent with data from other years and much higher than its more recent software expenditures and forecasts. The inclusion of this 1999 data seriously inflated the annual estimate of costs. In the absence of Verizon's full explanation of the significant spike in 1999 costs, those 1999 costs should be excluded from the calculations.

Q. SHOULD VERIZON'S CURRENT RTU EXPENDITURES BE USED TO DETERMINE FORWARD-LOOKING RTU FEES IN A TELRIC STUDY?

A. No. Verizon's embedded RTU expenditures can include software purchases necessary to update older switches. As discussed previously, a TELRIC study requires a completely new network to be built that would eliminate the need to upgrade older generation switches that should not be reflected in a forward-looking environment. A large spike in expenditures, such as Verizon's 1999 costs, could also be the result of a one-time only RTU purchase that provides

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[89] *See* Verizon RTU Factor Study Part G-9, Sheet labeled "Workpaper 1_Pg1" showing expenditures for 1999 and 2000 and estimated expenditures for 2001 and 2002 in columns D-F. The 1999 expenditure is more than twice as high as any other year.

switch software functionality for the rest of the life of the switches, requiring a longer time period to amortize than Verizon's assumption of four years.

Q. WHAT CORRECTIONS DO YOU SUGGEST?

A. The minimal amount of information provided by Verizon does not allow us to make any in-depth review or recommendations.[90] If further information is provided regarding these fees, AT&T/WorldCom may file Supplemental Testimony. However, at a minimum, the RTU factor should be recalculated, excluding the unusually high RTU fees in 1999. AT&T/WorldCom's restated rates excluded the 1999 data and recomputed the RTU factor based on the three other years of data provided by Verizon.[91]

Q. HAS VERIZON ASSIGNED THE UNSUBSTANTIATED RTU COSTS TO UNE RATES IN AN APPROPRIATE MANNER?

A. No. Verizon has inappropriately assigned the RTU costs to the minute-of-use UNE rate element when these costs should be assigned to the ports.

Q. HOW DOES VERIZON INCUR RIGHT-TO-USE COSTS?

A. Verizon typically pays RTU fees either on a per-switch or per port-basis, or as part of a larger buy-out contract that could cover all of Verizon's switches.[92] Buy-out

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90 *See* Verizon's response to AT&T's Data Request Number 9, Requests 7(c),(h),(i),(j).

91 Using three years of data is consistent with other areas of Verizon's study, such as the line growth data provided in response to AT&T Data Request 9-12. *See* Attachment 6 for the RTU factor recalculation.

92 Verizon confirmed that it negotiates fees for right-to-use licenses on a buyout basis in its response to AT&T Request Number 9, Request 44.

contracts allow an ILEC to purchase software for all (or sometimes a subset) of its switches, rather than purchasing the software on a per-switch or per-line basis. The implicit cost driver would be the total number of switches that the buy-out covers.

Q. ARE RTU FEES EVER PAID BASED ON MINUTES-OF-USE OR CALLS?

A. RTU fees are the same without regard to the number of calls or minutes of use of a switch, and we have never seen RTU fees charged by the switch manufacturer on a minute of use or call basis. Thus, even if Verizon could substantiate its software costs, they should be allocated to the non-traffic sensitive switch port rates, and not to the traffic sensitive minute-of-use rates.

Q. WHY RECOVER RTU COSTS VIA THE PORTS?

A. RTU costs are incurred primarily on a per-switch basis (or directly on a per-port basis). Exhaustion of ports is the cost driver for the purchase of an additional switch and the incurrence of additional RTU fees. Cost causation principles are best served by allocating RTU fees to the ports in the same manner as the "getting started" costs, and in the same manner that Verizon incurs its costs.

AT&T/WorldCom's restated minute-of-use costs exclude the RTU fee and assign a recomputed RTU fee to the port elements.[93]

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[93] The corrected Verizon RTU factor described above must be further recomputed because it is being applied to a different amount of switch investment (AT&T's proposed non-traffic sensitive investment) than the amount in Verizon's study. *See* Attachment 5 for this recomputation.

H. SWITCH ENGINEERING AND INSTALLATION FACTORS ARE OVERSTATED

Q. WHAT IS THE SWITCH EF&I FACTOR?

A. The engineering, furnished and installed ("EF&I") factor is the loading factor used to add items such as vendor engineering, Verizon engineering, vendor installation and Verizon installation, and sales tax in order to convert the material-only cost of a switch to a fully installed cost.

Q. HOW DID VERIZON COMPUTE ITS EF&I FACTOR?

A. Verizon used Verizon-East region-wide embedded data from its Detailed Continuing Property Records (DCPR) to calculate its EF&I factor. The Verizon EF&I factor was derived by comparing the material cost of the equipment to the total installed cost of the equipment.

Q. DOES VERIZON'S CALCULATION PRODUCE A REASONABLE EF&I FACTOR?

A. No. Verizon's EF&I factor is unreasonably high.

Q. DOES VERIZON PROVIDE ANY JUSTIFICATION FOR ITS HIGH EF&I COSTS?

A. No. Verizon response to AT&T Data Request Number 9, Request 31 seeking detailed DCPR data supporting Verizon's claimed EF&I factor provided only a column called "installed investment" without any data that underlie the installation costs. The integrity of the DCPR data is in question given the FCC's December 1998, audit findings of Verizon's Continuing Property Records.

In the Massachusetts UNE proceeding, VZ-MA admitted that it always performs its own engineering and installation and does not put such work out to competitive bid.[94] As a result, marketplace competitive pressures that encourage efficiencies are absent, and reliance on this data to calculate a forward-looking TELRIC EF&I factor to be applied throughout the VZ-East region is inappropriate unless Verizon demonstrates that the Verizon costs are competitive with the marketplace. Verizon has not made this showing.[95]

Q. WHAT DO YOU PROPOSE IS THE REASONABLE FORWARD-LOOKING VENDOR PORTION OF THE EF&I FACTOR?

A. SCIS can compute the vendor engineering and installation portion of the engineering and installation factor as it calculates both [1] material-only or [2] vendor EF&I costs. AT&T/WorldCom used the EF&I data from the SCIS/MO outputs to develop an appropriate vendor EF&I factor.[96]

Q. WHAT DOES AT&T/WORLDCOM PROPOSE AS A REASONABLE FORWARD-LOOKING EF&I FACTOR TO BE USED AS THE INPUT TO VCOST?

A. Given the questions raised by Verizon's incomplete documentation and by the FCC's audit of the underlying data that Verizon relies on to develop the EF&I

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94 *See* Verizon's response to AT&T's Request Number 3, Request 4 in the Massachusetts UNE proceeding DTE-01-20.

95 EF&I Factors were provided by many companies in the FCC's 1992 Open Network Architecture filings. The average EF&I factor was 10%. In addition, an 8% EF&I factor was decided upon in the FCC's USF proceeding, see In the Matter of Federal-State Joint Board on Universal Service, CC Docket Nos. 96-45, 97-160, FCC 99-304 (rel. Nov. 2, 1999), at ¶307.

96 *See* Attachment 2.

factor, use of an earlier Verizon factor is appropriate to determine the local telephone company portion of the EF&I factor. Verizon used a .1080 factor in its February 13, 1992 filing of additional cost information and workpapers in response to the FCC's MOO DA 92-128 released January 31, 1992 (ONA Tariff Order). AT&T/WorldCom used the EF&I data from the SCIS/MO outputs for the vendor portion of the factor in conjunction with the Virginia sales tax and the 11% Verizon portion of the factor to develop a reasonable EF&I factor that is approximately 60% of Verizon's claimed factor.

I. RECIPROCAL COMPENSATION RATES SHOULD BE CALCULATED USING UNE SWITCH RATES

Q. DOES VERIZON INCLUDE THE SAME SWITCHING COSTS IN THE DEVELOPMENT OF RECIPROCAL COMPENSATION AND UNE SWITCH RATES?

A. In its response to data requests, Verizon admitted that the switch processing of UNE traffic and reciprocal compensation traffic is the same.[97] Notwithstanding this admission, Verizon has arbitrarily chosen not to include the substantial "getting started" costs and RTU fees in the reciprocal compensation rates, even though it included these same costs in its UNE usage rates.[98]

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[97] *See* Verizon's response to AT&T Data Request Number 9, Request 22: "On a strictly technical basis, the switch does not treat either type of terminating call differently. However, Verizon VA has allocated the costs differently."

[98] *See* Verizon's response to AT&T Data Request Number 9, Request 23.

Q. HOW DOES VERIZON JUSTIFY ITS DECISION TO INCLUDE THESE COSTS IN UNE SWITCH USAGE COSTS AND NOT IN RECIPROCAL COMPENSATION COSTS?

A. Verizon claims it is including only incremental costs of the *additional* traffic associated with terminating other carriers' traffic. Verizon claims that reciprocal compensation traffic does not cause a burden to processing capacity (or apparently cause any increase to RTU fees), and as a result, Verizon excluded both "getting started" costs and RTU fees from reciprocal compensation.[99]

Q. IS VERIZON'S EXPLANATION REASONABLE?

A. No. The same argument that Verizon makes about reciprocal compensation also applies to UNE traffic. Verizon is seeking to maximize its UNE revenues and minimize the costs of reciprocal compensation that Verizon pays.

Q. ARE THERE MODIFICATIONS YOU ARE RECOMMENDING TO VERIZON'S STUDY THAT WILL VIRTUALLY ELIMINATE THIS PROBLEM?

A. Yes. As discussed above, the "getting started" cost of a switch and its RTU fee should not be included in the traffic sensitive UNE elements but properly belong in the non-traffic sensitive port elements. When this correction is made, the argument about assignment of "getting started" costs and RTU fees to UNEs or reciprocal compensation is moot because the costs are fully (and properly) assigned to the ports.

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[99] *See* Panel testimony at 204.

If, however, the Commission does not accept AT&T/WorldCom's proposal to assign the "getting started" cost and the RTU fees to the ports, then these costs must be fairly apportioned to all traffic, including reciprocal compensation, and not just to UNE switch usage rates.[100]

J. SUMMARY AND CONCLUSION

Q. PLEASE SUMMARIZE THIS PORTION OF YOUR TESTIMONY

A. Although severely limited by untimely responses and lack of data requested in discovery, we have identified fundamental flaws in Verizon's switch cost study that create severe overstatements in switch UNE elements. The flaws include use of an incorrect short-run growth-only switch price for a long-run study, a flawed methodology for developing discount inputs, understatement of port utilization inputs, RTU fees and feature port additives based on questionable inputs (for which Verizon has failed to provide appropriate supporting information), an EF&I factor that is too high, misallocation of non-traffic sensitive port-related costs to the local switch usage rate element, and use of inconsistent assumptions for UNE and reciprocal compensation cost development.

Q. PLEASE STATE YOUR CONCLUSIONS.

A. Verizon's cost study is fatally flawed and should be rejected. If the Commission does not accept the modified Synthesis Model sponsored by Mr. Pitkin and its results as a foundation for switch UNE costs, then Verizon's study must be

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[100] This correction needs to be made in both the end office switch and the tandem switch (footnote continued)

corrected as described herein. AT&T/WorldCom's restated switch rates include the corrections recommended in this testimony.

V. TRANSPORT

A. INTRODUCTION AND PURPOSE OF TESTIMONY

Q. PLEASE DESCRIBE THE PURPOSE OF THIS PORTION OF THE PANEL TESTIMONY AND PROVIDE A SUMMARY OF ITS CONCLUSIONS.

A. This testimony reviews Verizon's claimed interoffice transport and common (also known as shared) transport costs as presented in Verizon's Direct Panel Testimony. This testimony identifies and explains the errors that Verizon VA made with regard to both and recalculates the interoffice transport and common transport costs to correct these errors.

Verizon VA has significantly overstated its forward-looking economic costs for dedicated interoffice transport and common transport. In particular, Verizon VA made the following errors:

- For dedicated interoffice transport, Verizon VA made fundamental methodological errors in its study. The most significant error is Verizon VA's understatement of the capacity of the SONET rings used to provide dedicated interoffice transport in its study, thereby significantly overstating the costs for the circuits riding those SONET rings.

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investments.

- Verizon VA's cost study also improperly includes Digital Cross-connect System ("DCS") on most dedicated transport circuits even though the competitive local exchange carrier ("CLEC") may not want this element. Consistent with the FCC's Advanced Services Order and with the terms of the Verizon VA/AT&T and Verizon VA/MCImetro interconnection agreements, DCS should be treated as a separate unbundled element, which a CLEC has the option to purchase based on cost and network considerations.
- Verizon VA's installation factor for transport equipment is significantly higher than even Verizon's own data demonstrates to be reasonable.
- Verizon VA has failed to provide rates for DS1 to DS0 and DS3 to DS1 multiplexing even though this network element is essential for dedicated transport and is normally included in Verizon's cost studies for interoffice dedicated transport.
- Verizon VA has also significantly overstated the costs for common transport. Verizon VA has based the cost for common transport on its dedicated transport cost study. Thus, errors described in our testimony relating to dedicated transport must also be corrected with regard to common transport costs.

B. VERIZON'S CLAIMED INTEROFFICE DEDICATED TRANSPORT COSTS

1. CORRECTION OF PORTS PER NODE CALCULATION

Q. HOW DOES VERIZON PROVIDE FOR INTEROFFICE DEDICATED TRANSPORT IN ITS COST STUDY?

A. In conducting its purported forward-looking economic cost study, Verizon's cost model uses SONET rings to provide interoffice transport. SONET rings are a technology that allows for electrical (DS0, DS1, DS3, and STS1) and optical (OC-3 and OC-12) circuits to be easily added to or removed from a transport ring that provides protected (or redundant) transmission between nodes on the ring. SONET nodes are the point where dedicated transport circuits enter and exit the fiber optic ring. The terminal equipment at these SONET nodes convert electrical signals into optical signals, when needed, and multiplexes these signals up to the appropriate speed. SONET terminal equipment comes in several different bandwidths or "speeds." OC-48 SONET equipment is able to transmit signals at approximately 2448 megabits per second. This is the SONET ring transmission speed Verizon has used in its cost study for interoffice facility cost. The capacity of an OC-48 SONET depends on the type of SONET ring that has been deployed. Verizon's assumption that the capacity of an OC-48 SONET ring of 48 DS3s is reasonable, although the capacity can actually be greater.

Q. WHAT IS THE RELATIONSHIP BETWEEN THE OC-48 SONET RING USED BY VERIZON AND THE NUMBER OF NODES ON THE SONET RING?

A. For every DS3 that is placed on a SONET ring, two ports must be used for the DS3 circuit – one at each of the nodes over which dedicated transport circuit is

moving. In other words, if the capacity of an OC-48 SONET ring were determined to be 48 DS3s, then 96 ports would be needed for the 48 DS3 circuits operating between the nodes on that SONET ring. A key issue is the number of nodes on a SONET ring, but the general principle is that the larger the number of nodes on the ring serving these 96 ports, the lower the utilization of any one of those individual nodes. Each of the OC-48 SONET nodes has the ability to actually terminate 48 DS3 circuits. As such, as more nodes are added to each SONET ring, the potential utilization of the SONET nodes on those rings decreases.

Q. DOES VERIZON'S ASSUMPTION CONCERNING THE NUMBER OF NODES AND PORTS ON A SONET RING RESULT IN REASONABLE COSTS FOR DEDICATED TRANSPORT?

A. No. Verizon has significantly understated the number of ports that must be used at each SONET node to provide 48 DS3 circuits on the SONET ring.[101] As a result, Verizon has significantly overstated its investment per DS3, which results in substantially inflated dedicated interoffice transport costs.

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[101] Verizon has also significantly understated the number of ports that must be used at each SONET node to provide 48 STS1 circuits and 16 OC-3 circuits.

Q. IN WHAT WAY HAS VERIZON SIGNIFICANTLY UNDERSTATED THE NUMBER OF PORTS USED ON ITS SONET RINGS IN ITS COST STUDY?

A. Verizon indicated in its interoffice dedicated transport cost study that the capacity of an OC-48 Bi-directional Line Switched Ring ("BLSR") is 48 DS3s.[102] In addition, Verizon asserts that it has on average 3.79 nodes per SONET ring.[103] As we explained above, to support 48 DS3s within a SONET ring, 96 ports must be available within the SONET nodes because each DS3 must have a port to enter the SONET ring at one node and a second port to depart the SONET ring at another node.[104] Consequently, given Verizon's assumptions of 48 DS3s per SONET ring and 3.79 nodes per SONET ring, each node must have on average

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102 Workpaper Part D-2, VA PART D-2 IOF_MODEL Workbook, "Parameters" Spreadsheet, Row 373. The assumption of 48 DS3s per OC-48 BLSR is actually a conservative estimate. In reality, BLSR SONET rings can support more than 48 DS3s depending on the number of nodes on the ring and on the network engineering applied. The engineering rule is that no cross section between two nodes on the SONET ring can exceed 48 DS3s. This engineering rule, though, can permit more than 48 DS3s on the SONET ring as a whole. In short, while the remainder of this testimony will accept Verizon's assumption of 48 DS3s per OC-48 SONET ring (but account for this assumption correctly), the Commission should realize that this is a very conservative assumption from a cost standpoint.

103 Workpaper Part D-2, VA PART D-2 IOF Eng_SUP Workbook, Cell B14. In other proceedings (*e.g.,* New York and Massachusetts), Verizon has explicitly stated the average number of ports per ring in the interoffice dedicated transport cost studies. Verizon then multiplies this value of ports by the average distance between nodes to arrive at an average distance per ring. In Verizon's FCC filing, Verizon failed to state explicitly the average number of ports per ring or the average distance between nodes but instead embedded these two pieces of information in Cell B14. The 3.79 value, however, compares reasonably with the values found in New York (3.76 nodes per ring) and Massachusetts (3.83 nodes per ring).

104 The discussion of the number of nodes per ring is to the "logical" number of nodes that are on a particular SONET ring. Often there will be many more "physical" nodes on fiber rings where the fiber passes through the node, but SONET electronics are not placed on that node. The important factor for developing the number of ports per node is the number of "logical" nodes per ring that have electronics at those nodes.

approximately 26 ports.[105] Verizon's interoffice dedicated transport cost study, however, assumes only 16 ports per node, understating the number of required ports in its cost study by 38.5%.[106]

Q. HOW DID VERIZON MAKE ITS FLAWED CALCULATION OF INTEROFFICE DEDICATED TRANSPORT COSTS?

A. It appears that Verizon took the 48 DS3s per SONET ring and divided by three nodes (the more conservative of the whole number of nodes comprising the average of 3.79 nodes) and calculated 16 ports. Verizon's flawed methodological approach, however, failed to account for separate entry and exit ports on different nodes on the ring. Thus, if a DS3 uses 16 ports to enter the ring on one node it also needs 16 ports on a separate node to exit the ring for a total of 32 required ports.[107]

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105 Mathematically, the 26-port figure is derived as follows: The 3.79 nodes per ring average indicates that Verizon's SONET rings generally have either 3 or 4 nodes per ring. For the 3-node rings, assuming 96 ports are available on the ring, there are on average 32 ports per node (96 ports / 3 nodes). For the 4-node rings, again assuming 96 ports on the ring, there are on average 24 ports per node (96 ports / 4 nodes). Given the average of 3.79 nodes per ring, the 3-node scenario would occur 21 percent of the time and the 4-node scenario 79 percent of the time. Using this distribution to determine the number of ports per node yields a total of 25.68 ports per node (32 * 0.21 + 24 * 0.79). We have rounded this value to 26 ports for our analysis.

106 Verizon uses a 75 percent fill factor in developing the cost for interoffice dedicated transport. This factor has not been altered in the restated cost study. However, Verizon's understatement of the capacity of the OC-48 is only compounded by this fill factor.

107 In another proceeding, Verizon has claimed that the forward-looking number of nodes per ring should be six, thereby supporting the 16 ports for node that Verizon was using. (*See* State of New York Public Service Commission, *Proceeding on Motion of the Commission to Examine New York Telephone Company's Rates for Unbundled Network Elements*, Case 98-C-1357, Workpaper Part C-1 – Section 1.0 to the Panel Testimony of Bell Atlantic – New York on Revised Costs and Rates for Unbundled Network Elements
(footnote continued)

Q. HOW DOES THIS FAILURE TO INCLUDE THE APPROPRIATE NUMBER OF PORTS PER NODE IMPACT VERIZON VA'S COST ANALYSIS?

A. The bulk of the cost associated with SONET rings is fixed based on physically establishing the SONET node. As a result, the vast majority of the investment is incurred whether one DS3 or 48 DS3s are in service at the particular SONET node. In its cost analysis, Verizon averages the total cost of the SONET ring across the number of ports that are available at the SONET node. Under Verizon's cost analysis, the lower the number of ports, the greater the cost; the greater the number of ports, the lower the cost. Thus, the average number of ports per node must be accurately determined so as to not misstate the average investment per port. By understating the number of ports per node by 38.5% for DS3s, Verizon has significantly overstated the investment per DS3 in its cost calculation. As a result, Verizon's claimed interoffice dedicated transport costs are similarly inflated.

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and Related Wholesale Services, February 24, 2000, p. 6 (line 372). [Exhibit 323 in the New York UNE cost proceeding] This document shows that Verizon did not report that it was using six nodes per ring, but rather 3.79 nodes per ring.) Verizon's claim is simply not plausible. Given the growth in data traffic and related growth in transport necessary to support such traffic, the forward-looking impact on SONET network engineering is to realize *smaller* numbers of nodes per ring – not *larger* number of nodes per ring. It simply is not reasonable for Verizon to argue that the forward-looking number of nodes per ring is higher than approximately 3.79.

Some networks are migrating away from OC-48 transport to OC-192, effectively quadrupling the capacity of the transport network. In doing this, ILECs can increase the number of nodes per ring, but the unit cost per DS3 is significantly reduced as a result of the increased number of ports available in moving from OC-48 to an OC-192 network.

Q. IN YOUR RECALCULATION OF VERIZON'S INTEROFFICE DEDICATED TRANSPORT COSTS, DID YOU USE THE 3-NODE ASSUMPTION USED BY VERIZON?

A. No. This assumption is not consistent with 3.79 nodes per SONET ring average used by Verizon in its cost study. The 3.79 nodes per ring is an appropriate figure that should be used consistently in the Verizon cost study.

Q. DO THE INFLATED DS3 COST CLAIMS AFFECT VERIZON'S CLAIMED COSTS FOR OTHER SPEEDS OF DEDICATED TRANSPORT?

A. Yes, Verizon used the DS3 Dedicated Transport cost study as the basis for the DS1 and DS0 Dedicated Transport cost studies, and this flawed analysis likewise resulted in inflated cost claims for DS1 and DS0 dedicated transport. Consequently, the required correction to Verizon's DS3 Dedicated Transport cost study must also be made in these downstream cost studies. Verizon also made the same type of error in its STS-1 and OC3 Dedicated Transport cost studies. The correct number of ports per node for these speeds of dedicated transport using the approach detailed above for DS3s is 26 and nine, respectively for the STS-1 and OC3 Dedicated Transport cost studies.[108] Instead, Verizon incorrectly used 16 and six, respectively, which substantially inflated its claimed costs.

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[108] An OC-48 SONET ring has a capacity of 48 STS-1 circuits and thus requires 96 STS-1 ports on the nodes of the SONET ring. An OC-48 SONET ring has a capacity of 16 OC-3 circuits and requires 32 OC-3 ports on the nodes of the SONET rings. An OC-48 SONET ring has a capacity of four OC-12 circuits and requires eight OC-12 ports on the nodes of the SONET rings. The remaining calculations to determine the number of ports per node for the SONET rings are identical to those outlined for the DS3 ports.

Q. COULD YOU PLEASE SUMMARIZE THE IMPACT OF THIS CORRECTION IN VERIZON'S COST STUDY FOR THE VARIOUS FORMS OF DEDICATED TRANSPORT?

A. Yes. The following table sets forth the average investment per port using Verizon's incorrect analysis and the restatement that we have done using appropriate assumptions of the numbers of required nodes and ports for each of the various forms of dedicated transport.[109] The average investment uses the same split between Fujitsu and Lucent equipment as set forth in Verizon's original cost study.

Port Type	Corrected Investment Level for Verizon's Cost Study	Verizon's Claimed Investment Level
OC-48 – OC-3 Ports	$8,828.59	$13,078.47
OC-48 – STS-1 Ports	$2,751.91	$4,351.86
OC-48 – DS3 Ports	$2,730.58	$4,317.20

2. CORRECTION TO PERMIT THE CLEC ELECTION OF DCS

Q. WHAT IS DCS?

A. DCS is an acronym for "Digital Cross-connection System." DCS allows for telecommunications providers to electronically cross connect different speeds of dedicated transport. For example, this piece of equipment allows the telecommunications carrier to take multiple DS1 dedicated transport circuits, entrance facilities, or loops and place them onto a DS3 circuit that can then be

[109] Unlike Verizon, which divided three nodes by the 48 DS3s, we used the more accurate 3.79 node average provided by Verizon.

carried to another location. This is also referred to as "grooming." Other technology (*e.g.*, ATM switching) is able to perform many of the same functions as DCS with a much lower level of investment. As such, DCS is normally and economically used when the electronic capability available with DCS can best be put to use (*e.g.*, when many changes are expected in the circuits connecting two locations or when the ability to re-provision circuits across different high speed transport is important). ILECs choose when and where to use DCS in dedicated transport circuits based on cost and performance trade-offs. CLECs should have the same opportunity to make this choice through unbundling.

Q. HOW HAS VERIZON COSTED AND PRICED DCS?

A. Verizon has averaged the cost of DCS into its prices for interoffice transport.

Q. IS THIS APPROPRIATE?

A. No. ILECs choose when and where to use DCS in dedicated transport circuits based on cost and performance trade-offs. With unbundling, CLECs should have the same opportunity to decide when and where to use DCS in dedicated transport circuits.

Q. DID THE FCC FIRST REPORT AND ORDER PROVIDE THAT ILECS SHOULD OFFER DEDICATED TRANSPORT AND DCS SEPARATELY?

A. Yes. The FCC in its *First Report and Order* specifically refers to the unbundling of DCS from dedicated transport:

> Accordingly, we conclude that the section 251(d)(2)(B) requires incumbent LECs to provide access to shared interoffice facilities and dedicated interoffice facilities between the above-identified points in incumbent LECs' networks, including facilities between incumbent LECs'

> end offices, new entrant's switching offices and LEC switching offices, and DCSs. We believe that access to these interoffice facilities will improve competitors' ability to design efficient network architecture, and in particular, to combine their own switching functionality with the incumbent LEC's unbundled loops.[110]

The FCC required that the new entrant be permitted to have access to DCS. Simply giving the CLEC access to the DCS equipment does not allow the ILEC to make its use mandatory and include it as an element in its cost study. The CLEC is free to elect not to purchase this element, as other technology affords other alternatives for accomplishing the same functionality as DCS, in a much less costly manner (*e.g.*, ATM switching).

Q. DOES VERIZON PROVIDE ACCESS TO DCS ON A SEPARATE BASIS ALREADY?

A. Yes. Verizon has a Special Access Tariff (Tariff No. 1) that provides access to DCS functionality known as IntelliMux (see § 7.2.12). This service permits "allows point-to-point rerouting of customer...facilities."[111] Moreover, this tariff states that the price for this DCS functionality is based on the type of port that is acquired – Voice Grade, DS1, or DS3.[112] As such, if the customer wants to connect DS3 Special Access Service to the DCS, the customer must purchase a DS3 network access port at the DCS. In short, this is the appropriate approach to

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110 *In the Matter of Implementation of the Local Competition Provisions in the Telecommunications Act of 1996*, CC Docket No. 96-98, FCC *First Report and Order*, FCC Docket No. 96-325, Released August 8, 1996, ¶ 447.

111 Verizon Special Access Tariff FCC No. 1, § 7.2.12(E).

112 Verizon Special Access Tariff FCC No. 1, § 7.2.12(F).